REMARKS/ARGUMENTS

The Examiner rejected claims 1-38 as anticipated (35 U.S.C. §102(b)) by King (U.S. Patent No. 6,540,004). Applicants traverse for the following reasons.

Amended claims 1, 13, 24, and 27 require: providing a source map indicating blocks of data striped across a first plurality of storage units and a destination map indicating blocks of data striped across a second plurality of storage units, wherein data is migrated from stripes indicated in the source map to corresponding stripes indicated in the destination map; and for each of a plurality of source stripes to copy to corresponding destination stripes, separately performing, in response to determining that the source stripe and the destination stripe occupy a same physical location on the storage units, writing the data from a source stripe to a copy area and writing the data from the copy area to a corresponding destination stripe.

Applicants amended these claims to recite that the operation of determining that the source stripe and the destination stripe occupy a same physical location on the storage units and if so writing the data from a source stripe to a copy area and writing the data from the copy area to a corresponding destination stripe is performed separately for each of a plurality of source stripes to copy to corresponding destination stripes. This added requirement is disclosed in at least para. 14 of the Specification. Applicants further amended claims 13 and 25 to remove the limitation reference numerals.

The Examiner cited col. 8, line 50 through col. 9, line 7 of King with respect to the pre-amended claims. (Second Office Action, pgs. 1-2 and 7). Applicants traverse with respect to the amended claims.

The cited cols. 8-9 discusses, with respect to FIG. 6a, writing stripes from 3 disks to 4 disks. The cited cols. 8-9 discuss an equation to calculate a destructive zone. A destructive zone is the number of data stripes being migrated into the destination array that are liable to suffer data loss in the event of a power loss because they are being overwritten as a result of the migration. (King, col. 2, lines 4-9) Data stripes in the destructive zone are copied to a buffer before migration starts. (King, col. 2, lines 22-35, col. 4, lines 21-40)

According to the cited cols. 8-9, once the destructive zone is calculated, to back up each data stripe in the destructive zone, before the data is copied, the RAID controller copies the data onto a buffer before the data is migrated.

Applicants submit that the cited and discussed King do not disclose the claim requirement that for each of a plurality of the source stripes to migrate to destination stripes, a separate operation is performed to determine that the source stripe and the destination stripe occupy a same physical location on the storage units and, if so, writing the source stripe to a copy area, and writing the data from the copy area to the destination stripe. The cited King does not separately determine whether each of a plurality of source stripes and destination stripes occupy a same physical location to determine whether to copy to the copy area. Instead, the cited King calculates an overall destructive zone of stripe groups and then the stripe numbers in those stripe groups in the destructive zone are copied to the buffer. Consequentially, King does not determine separately for each of a plurality of the source stripes to migrate to corresponding destination stripes whether the stripes occupy the same physical location because King once determines the destructive zone and then uses the buffer for stripes in that general destructive zone. There is no separate determination in the cited King that for different source stripes whether the source stripes occupy the same physical location as the corresponding destination stripes.

Accordingly, amended claims 1, 13, 24, and 27 are patentable over the cited art because the cited King does not disclose all the claim requirements.

Claims 2-12, 14-23, 25, 26, and 28-38 are patentable over the cited art because they depend from one of claims 1, 13, 24, and 27, which are patentable over the cited art for the reasons discussed above. Moreover, the following dependent claims provide additional grounds of patentability over the cited art for the following reasons.

Claims 4, 16, 25, and 30 depend from claims 2, 13, 24, and 28, respectively, and further require indicating a number of a current unit of operation being processed; and indicating data is being copied through the copy area in response to determining that the source stripe and destination stripe involved in the current unit of operation occupy the same physical locations.

The Examiner cited col. 7, lines 13-25 of King as disclosing the additional requirements of these claims. (Second Office Action, pg. 3) Applicants traverse.

The cited col. 7 mentions a migration involving a RAID level change. When delta is zero, the destructive zone includes all stripe groups. One stripe group is copied onto the backup buffer and then migrate that stripe from source to destination. The direction of data migration is forward.

Although the cited col. 7 mentions that stripes in a destructive zone are copied to a buffer, there is no disclosure of the claim requirement of indicating data is being copied through the copy area in response to determining that the source stripe and destination stripe involved in the current unit of operation occupy the same physical locations. As discussed, the cited col. 7 does not disclose determining whether a particular source stripe and destination stripe occupy a same physical location as claimed separately for each of a plurality of source stripes and corresponding destination stripes.

Accordingly, claims 4, 16, 25, and 30 are patentable over the cited art because the additional requirements of these claims are not disclosed in the cited King.

Claims 8, 20, and 34 depend from claims 1, 13, and 27, respectively, and further require determining whether an overlap comprising the source stripe and the destination stripe occupying the same physical location is impermissible and aborting the migration in response to determining that the overlap is impermissible.

The Examiner cited col. 4, lines 50-57 as disclosing the additional requirements of these claims. (Second Office Action, pg. 5)

The cited col. 4 mentions identifying the number of stripe groups in the destructive zone based on factors that may include the RAID redundancy factor in terms of data copy count before and after the data migration, the number of data disks existing before and after data migration, and whether or not less data in a stripe group will result from the migration.

Nowhere does this cited col. 4 anywhere disclose or mention determining whether an overlap comprising the source stripe and the destination stripe occupying the same physical location is impermissible and then aborting the migration in response to determining that the overlap is impermissible. Instead, the cited col. 4 discusses how to identify the stripes in a destructive zone, which is the amount of storage that would or might be overwritten during the data migration.

If the Examiner maintains this rejection, Applicants request that the Examiner identify where the cited King discloses determining whether a particular overlap is impermissible, such as when a destructive zone is impermissible and then aborting if the destructive zone is impermissible.

Accordingly, claims 8, 20, and 34 are patentable over the cited art because the additional requirements of these claims are not disclosed in the cited King.

Claims 9, 21, and 35 depend from claims 8, 20, and 34, respectively, and further require that determining whether the overlap is impermissible comprises: determining a depth of a source volume including the source stripes and a depth of a destination volume including the destination stripes; determining a source physical location on one storage unit of a first block in a first stripe in the destination volume and a destination physical location on one storage unit of a first block in a first stripe in the source volume; and determining that the migration is impermissible in response to determining: (1) that the destination volume depth is less than or equal to the source volume depth and the destination physical location is greater than the source physical location or (2) that the destination volume depth is greater than the source volume depth and the destination physical location is less than the source physical location.

The Examiner cited col. 5, line 51 through col. 7, line 12 of King as disclosing the additional requirements of these claims. (Second Office Action, pg. 5)

The cited cols. 5-7 discuss calculating delta and migrating data for different values of delta. Applicants submit that the cited cols. 5-7 nowhere disclose or mention determining whether an overlap is impermissible, nor do they disclose that an overlap is impermissible in response to determining: (1) that the destination volume depth is less than or equal to the source volume depth and the destination physical location is greater than the source physical location or (2) that the destination volume depth is greater than the source volume depth and the destination physical location is less than the source physical location.

If the Examiner maintains this rejection, Applicants request that the Examiner identify where the cited King discloses determining whether a particular overlap is impermissible, such as when a destructive zone is impermissible, and then aborting if the destructive zone is impermissible. Applicants request that the Examiner identify where King discloses determining a destructive zone impermissible when: (1) that the destination volume depth is less than or equal to the source volume depth and the destination physical location is greater than the source physical location or (2) that the destination volume depth is greater than the source volume depth and the destination physical location is less than the source physical location

Accordingly, claims 9, 21, and 35 are patentable over the cited art because the additional requirements of these claims are not disclosed in the cited King.

Conclusion

For all the above reasons, Applicant submits that the pending claims 1-42 are patentable over the art of record. Applicants submit herewith the fee for the added claims. Nonetheless, should any additional fees be required, please charge Deposit Account No. 50-0585.

The attorney of record invites the Examiner to contact him at (310) 553-7977 if the Examiner believes such contact would advance the prosecution of the case.

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